

**The United States Agency for International Development,
USAID
Panamá City, Panamá**

And

**The National Authority of the Environment of Panama,
ANAM**

Clean Production Benefits

Setting and Using Clean Production Policy to Drive Changes

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1.0 Background

Panama's Environmental Law required the National Environmental Authority (ANAM) to regulate environmental impacts of private sector activities. At the present time no regulations exist to implement the parts of the law relating to norms and standards to encourage clean production. ANAM wants to adopt international norms and standards to encourage clean production. This activity represents a great opportunity for Panama to design regulations that will encourage clean production and sustainable economic growth while simultaneously protecting the environment.

To reach these goals required technical assistance that will permit ANAM, in close collaboration with the private sector, to evaluate international environmental norms to encourage clean production. An appropriate set of norms to encourage clean production will then be chosen, as appropriate. The technical assistance that was provided at the moment concerns three key industries: cement, tanneries, and electro-plating/metal finishing.

2.0 Activity Description

A previous activity took place designed to provide preliminary and short-term support to ANAM to outline technical and policy aspects of industrial clean production and to devise a policy strategy and recommended normative approach for Panama. During June's activity, the consultants identified and presented a range of options for the adoption of international norms and standards to

encourage clean production in Panama. This framework can then be used to guide ANAM in its efforts to convert the Panamanian industrial infrastructure from one focused on end-of-pipe technology to one focused upon clean production practices and prevention of industrial emissions and effluents. Activities included meetings with the private sector and ANAM, audit-lights of the three key industries, presentation of clean production alternatives and of regulatory options, and final recommendations to encourage the paradigm shift.

3.0 Observations

We spent only a few hours in each plant. Even with that limitation, we are confident that for the plants that we visited, there are excellent opportunities to demonstrate the value of a clean production approach to environmental policy. Table 1 shows potential environmental benefits if the companies that we visited would apply clean production principals to their operations. We have tried to quantify these benefits where possible.

Because of its visibility, the cement industry is an important sector and success there is very valuable. ANAM will be able to claim that setting strict limits for cement plants was a major factor in decision making. The facilities plan to purchase new equipment and controls that reduce the environmental impact of cement manufacturing.

For tanneries, we visited two plants that together, represent over three-fourths of the hides tanned in Panama (Teneria Progreso and Teneria Tauro). We have recommended that they reuse their waste chrome tanning baths. If successful, these two companies could save more than \$100,000 by not having to purchase imported chrome salts that they import. This would also eliminate the uncontrolled disposal of over 30,000 kg of Cr_2O_3 into Panama's environment. We have also recommended that they separate their liquid waste streams as follows: pelambre, chrome tanning, and all others. Segregation is essential to reusing chrome tanning solutions. By separating the pelambre waste from all others, the operators can manually remove solids instead of paying for a waste water pre-treatment system to do the same. We have made other, simple suggestions, too, but these two will have the largest impact. We expect that if the companies succeed, they will have saved enough money that they will be able to afford a waste water pre-treatment system that can meet the proposed effluent guidelines. Without the process changes first, meeting the proposed guidelines would be too expensive; worse, with mixed waste streams and large volumes, the pre-treatment itself would be less effective.

Metal finishing is a very broad field. We do not know how large it is in Panama because we only saw three companies, two rather large ones and one small one. Each plant had opportunities to modify parts of their production processes in ways that would reduce both the volume and toxicity of their waste water.

One company, CorreAguas, could close the loop on their only industrial waste water stream. Some people could call the volume and toxicity of this waste stream insignificant, and it is true that Panama faces greater challenges and

dangers. But what a compelling story: a Panamanian company collaborates with ANAM and USAID Panama to modify their process, sharing with others the internal decision making process, risks and rewards of making it to zero discharge! ***If successful, they will not need any waste water pre-treatment at all.***

This company had another significant clean production opportunity in their barrel painting line. There are vendors who supply paint booths that capture the overspray (paint solids that miss the work piece; typical solutions are to catch the overspray in a water curtain or air filters). A simple spray paint operation like we saw at CorreAguas may have a transfer efficiency of less than 50%. This proven paint booth lets the operator capture and reuse up to 98% of this overspray. The operator saves on paint purchases and has very little loss (contamination). CorreAguas had other minor opportunities but in general, they were a very well-run company and they were eager to solve these two particular problems.

Aluminio de Panama is another very well-run company. They, too, have some important process improvements and acquisitions that could make a measurable difference. They currently discharge waste water. Clean production changes will minimize the loading and volume of their discharges. Luckily, they have a little extra floor space that they could use to modify their cleaning and coating processes to reduce use of raw materials and water. We have also given them instructions on how to modify some of their process to reduce the mixing of water with toxics. This would reduce their capital and operating costs for a waste water pre-treatment system needed to meet the proposed standards. We also recommended smaller adjustments to another coating process that would reduce wasting.

The venerable owner of the small plant (Clavos y Alambres) has the experience and knowledge to modify rinsing practices that would lessen the impact on receiving waters. It remains to be seen if any significant modification to a process that he has created will be something that he is willing to achieve. In our opinion, he might be more motivated once he had a firm quote from an engineering firm for the cost of treating his waste water. Even though his volume is small, the capital costs would be more than enough to involve him in the process modifications.

Table 1: Summary of Environmental and Financial Benefits

*Estimated Potential Reductions for Selected Contaminants
By Implementing Clean Production Process Changes*

Contaminant	Estimated Benefit	Assumptions, Calculations and Comments
CO ₂	> 500,000 tons per year	Based on total energy consumption, wet vs. dry operations in US; coal with energy content of 8E9 calories per ton; and, 3.67 tons of CO ₂
Kiln Dust	> 500 tons per year	Based on estimated dust emissions of wet plant without an electrostatic precipitator (ESP) and baghouse vs. dry process with dust controls
Kiln Dust	\$50,000 per year	Value of dust captured in ESP and baghouse
Cr ₂ O ₃	> 30,000 kg per year	Based on both tanneries reusing their chrome solutions that would save them approximately 30% of their annual purchases of this imported salt
Cr ₂ O ₃	> \$90,000 per year	Imported salts contain 25% Cr ₂ O ₃ and cost approximately \$0.80 per kilogram
Tanning Solids	> 500 tons per year	These solids contribute to the BOD ₅ and COD (DBO and DQO) loading that can be kept out of receiving waters and sewers

4.0 Recommendations

- Adopt, in whole, the waste water pre-treatment Limites Maximos Permisibles (LMPs) that ANAM has been working on for two years and are due for final comments from industry this July 3, 2000.
- Use Banco Interamericano de Desarrollo (BID) monies to upgrade ANAM's analysis capabilities to more precisely measure some of these water pollutants and to train technical staff.
- Incorporate into these LMP regulations a process for industry to challenge a given standard, such that if they are able to prove that they merit consideration of a change, then, ANAM could change the specific norm for their case.
- Once the LMPs are established, write the rules that favor clean production.
- Set up a temporary, (from now until January 1, 2004) two-tier system for cement plant air pollution, one for plants built before 1960 and another for plants built after 1960.
- Expedite the process of establishing these air pollutant LMPs for dust, SO_x and NO_x for the two cement plants. But, simultaneously, prepare to use emergency powers from Decree 58 for establishing similar, temporary norms for the cement industry until the more permanent ones are fixed.
- Sign the proposed Clean Production Policy from March 2000 (Signed August 2000).

5.0 Discussion

Adopt the ANAM/Ministry of Health – Proposed Pre-Treatment Standards for Effluents to Surface Water and Sewers

By early July 2000, the private sector will have had their last opportunity to review the proposed LMPs for waste water. The technical team recommends that ANAM adopt all of these LMPs that survive this or any other comment period. When we reviewed these LMPs in March 2000, we felt that a few were beyond detection limits for industry and/or ANAM without upgrading equipment and capabilities. With backing by the BID, ANAM should be able to acquire the necessary laboratory equipment and training to be able to support and enforce the listed standards. We have also recommended a review mechanism that gives industry the option of presenting their technical case to ANAM offering proof that a given standard(s) would be impossible for them to meet. ANAM and that company would adjust the standard as required.

Setting these LMPs will force the private sector to measure all of their inputs and outputs to get a quote on building a waste water pre-treatment system to meet the LMPs. Experience has shown that avoiding a certain future sunk capital cost for treating waste water is one of the best motivators for clean production.

It is our opinion that these numbers are strict enough to help to protect human health and the environment and with an appropriate review mechanism they will also be flexible enough to work well for clean production and industry.

Risks

There is a risk that industry will reject regulations based on these LMPs. However, it is this short-term, negative atmosphere that opens the door to clean production. The companies will have to look to modify their processes to improve efficiencies if they hope to reduce their capital and operating costs for waste water pre-treatment plants. If the private sector rejects these standards and compliance is very low, human health and the environment will still be in great danger.

ANAM could have chosen more strict standards, but in our opinion, that would not have been an effective strategy at this time. Higher standards than those proposed would be more costly, more difficult to achieve and would probably depress compliance rates. High compliance rates are important for a credible and effective environmental regulatory agency and for a clean, profitable and healthy industrial eco-system.

Table 2: Criteria Air Pollutants LMPs

***Cement Plants Built Before 1960
Effective until January 2004***

SOURCE	LMP
Kiln Dust Particulates	600 $\mu\text{g}/\text{Nm}^3$
Kiln SO _x	800 $\mu\text{g}/\text{Nm}^3$
Kiln NO _x	1,000 $\mu\text{g}/\text{Nm}^3$
Cooler Dust Particulates	400 $\mu\text{g}/\text{Nm}^3$
Milling, Grinding, Conveying or Bagging Dust Particulates	400 $\mu\text{g}/\text{Nm}^3$

Table 3: Criteria Air Pollutants LMPs

***Cement Plants Built After 1960
Effective until January 2004***

SOURCE	LMP
Kiln Dust Particulates	150 $\mu\text{g}/\text{Nm}^3$
Kiln SO _x	1,000 $\mu\text{g}/\text{Nm}^3$
Kiln NO _x	800 $\mu\text{g}/\text{Nm}^3$
Cooler Dust Particulates	200 $\mu\text{g}/\text{Nm}^3$
Milling, Grinding, Conveying or Bagging Dust Particulates	200 $\mu\text{g}/\text{Nm}^3$

Table 4: Criteria Air Pollutants LMPs

*All Cement Plants
Effective from January 2004 until Revised*

SOURCE	LMP
Kiln Dust Particulates	100 $\mu\text{g}/\text{Nm}^3$
Kiln SO_x	400 $\mu\text{g}/\text{Nm}^3$
Kiln NO_x	500 $\mu\text{g}/\text{Nm}^3$
Cooler Dust Particulates	50 $\mu\text{g}/\text{Nm}^3$
Milling, Grinding, Conveying or Bagging Dust Particulates	50 $\mu\text{g}/\text{Nm}^3$

6.0 Next Steps

First, we should follow up with the seven companies that we have visited. Once they receive the more detailed technical recommendations, they deserve the right to “cross-examine” the one making the recommendations. ANAM and USAID Panama should ask each of them frankly, what, if anything, do they intend to do about actually modifying their processes for the better. Ask the companies what other support would they want or need. Then, set up a timetable for the companies to begin evaluating the proposed changes and follow up with them to see if they are sticking to the plan or need extra help. We do not know of many instances where the companies did not require additional help to actually implement any measurable changes. Once this has been agreed upon or resolved, then it is up to the companies to get to work and make the changes a reality. Without effective follow up, it is unlikely that anyone will have measurable benefits to show to others as a motivator for them to act also.

It is important to take this follow up step early. ANAM and USAID Panama need to know sooner, rather than later, whether they are working with good partners (someone who will actually implement reasonable recommendations). Also, they need to know what adjustments are necessary to move this effort out from this very small core to the whole of Panamanian industry.

Next, with these insights, ANAM and their consultants can take the LMPs and write the regulations that encourage clean production with more confidence on their part and more support from the private sector. It is very difficult to predict meaningful next steps beyond this point. There are three possible outcomes:

- All is well, stay the course;
- Make minor adjustments and then stay the course; or,
- All is not well and we need a new plan of attack.